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Central nervous system mycosis: Analysis of 10 cases

Anju Shukla[1], Megha Bansal[2], Mazhar Husain[3], Devendra Kumar Chhabra[4],
[1] Department of Laboratory Medicine, Sahara Hospital, Lucknow, India
[2] Department of Pathology, Sanjay Gandhi Postgraduate Medical Sciences, Lucknow, India
[3] Department of Neurosurgery, Sahara Hospital, Lucknow, India
[4] Department of Neurosurgery, Vivekananda Polyclinic and Institute of Medical Sciences, Lucknow, India

Correspondence Address:
Anju Shukla
Departments of Laboratory Medicine, Sahara Hospital, Viraj Khand, Gomtinagar, Lucknow
India

Abstract

Aim: To describe the clinicopathological features in patients with fungal infections of the central nervous system (CNS) presenting as mass lesions. **Materials and Methods:** A retrospective analysis of records obtained from 10 patients was done with histopathologically confirmed fungal infections presenting as ICSOL, diagnosed in the department of pathology. Clinical features at presentation, findings of radiological investigations performed and histopathology were noted for each patient and subjected for analysis. **Results:** Infection was higher in males, and paranasal sinusitis was the most common predisposing factor. Location was intraparenchymal followed by sphenoid wing. Four dural-based lesions mimicked meningioma clinically. The most common fungus identified was zygomycosis (seven cases), followed by phaeohyphomycosis (two cases) and aspergillosis (one case). **Conclusion:** There is a rising trend of CNS mycosis, both in immunocompromised and immunocompetent patients. Intracranial fungal granuloma may mimic radiologically as glioma or meningioma, therefore a high index of suspicion is needed to detect early CNS fungal infections, especially in immunocompetent young patients with no predisposing illness. Fungi should always be excluded in patients with inflammatory or granulomatous pathology of CNS.

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Full Text

INTRODUCTION

Fungal infections of the central nervous system (CNS), once a relatively rare occurrence, are now increasingly common due to widespread use of immunosuppressive therapy and increasing prevalence of AIDS. Heightened awareness and better diagnostic facilities have also led to an increase in the detection rates. CNS fungal infections occur in both immunocompromised and those with no predisposing factors. Although fungal infections of the CNS are per se not uncommon, their presentation as intracranial space occupying lesion is rare. We herein report the clinical, radiological and pathological findings of 10 patients with fungal infections of CNS presenting as mass lesions.

MATERIALS AND METHODS

Clinical, radiological and pathological data was retrieved for 10 patients who were diagnosed as having focal fungal infection of the CNS on the basis of histopathology findings over last 2 years in department of pathology, Sahara hospital. The following parameters were noted for each subject- presenting symptoms and signs, predisposing factors, location of lesion, identification of organism by culture techniques, blood culture report, and findings on X ray, CT and MRI. All patients had undergone full surgical resection and were treated with amphotericin B, fluconazole, or voriconazole after surgery. The biopsy specimen received had been subjected to both histopathological and microbiological analyses.

RESULTS

The mean age of patients in this study was 36.5 years (range; 15-65 years). Of the 10 patients reviewed, 8 were males and 2 were females. Most common presenting symptom was holocranial headache (80%) followed by seizures with altered sensorium (20%). Other symptoms were progressive loss of vision and weakness in limbs.

Most common predisposing features in this study was massive paranasal sinuisitis (three cases) followed by postoperative states (two cases). History of tuberculosis was obtained in two cases, while diabetes, chickenpox and post renal transplant were seen in one patient each.

Most common location of a lesion in this study was intraparenchymal (six cases). Dura-based lesions mimicking meningioma constituted four cases. Under intraparenchymal lesions most common site was temporal lobe (three cases) followed by right parietal, right frontoparietal and left frontal lobe (one case each). Dura-based lesions were located as sphenoidal mass (one case), mass on diaphragm sellae (one case), right basitemporal dural mass extending to greater wing of sphenoid (one case) and left basifrontal dural mass extending to lesser wing of sphenoid (one case).

Histopathological identification of the organisms was made which revealed most common organism as zygomycosis (seven cases) followed by phaeohyphomycosis (two cases) and

aspergillosis (one case) [Table 1]. Surgical procedures were done in these patients both for therapeutic and diagnostic purposes. Selected photographs of radiographs and histopathology are shown.{Table 1}

DISCUSSION

Infections of the CNS presenting as space occupying lesions are relatively uncommon and until recently only a few such mycotic infections came to neurosurgical attention. Predisposing factors are AIDS, malignancy, older age, and immunosuppressive medications. Immunocompetent hosts also have been known to suffer from fungal infections. Most often, infective organisms gain entry into the CNS through the hematogenous route, seed the parenchyma and cause tissue destruction. [1],[2],[3]

In our study, the overall incidence of CNS fungal infections was higher among males, the male:female ratio being 4:1. In a study by Khanna et al., the incidence of fungal infections was higher in males with a male:female ratio being 2.3:1. [4] In our study also, it was more common in males although patient number was small.

Diabetes and HIV infection have been reported to be the common predisposing factors in subjects with CNS fungal infections. [5],[6] In the present study, massive paranasal sinusitis followed by postoperative states were the most common predisposing factors.

Common presenting complaint in the present study was holocranial headache and neurological deficits were less frequent, which was similar to the previous studies. [5]

Most common intraparenchymal location in our study was temporal lobe followed by right parietal, and frontal lobe, while the most common location in previous studies were frontal lobe followed by middle cranial fossa, sellar and temporal lobe. [5],[7]

Radiographic findings suggestive of fungal infections can be appreciated in numerous studies. Although neoplasms are the common considerations in the presence of enhancing lesions with perilesional edema and mass effect on neuroimaging, non-neoplastic conditions in particular, infectious lesions can have similar imaging characteristics [Figure 1], [Figure 2], [Figure 3]. The frontal and temporal lobes are the most common sites for intracerebral granuloma formation, presenting as space-occupying lesions. Those located at the basifrontal or basitemporal regions are invariably mistaken for meningioma or tuberculoma both on imaging and at surgery. [1] {Figure 1}{Figure 2}{Figure 3}

Computed tomography scans in a study done by Dubey et al. showed irregular hypodense lesions with irregular, faint contrast enhancement and perilesional edema. Based on CT findings of a similar mass in isolation, however, the differential diagnosis for lesions seen included in their study were abscess, tuberculoma, meningioma and glioma. [5]

In our study, CT scans also showed heterogeneously enhancing mass lesion with perilesional edema and the differential diagnosis made were glioma, tuberculoma, and fungal infection. Four dural-based lesions were mimicking meningioma radiologically.

In the present study also most common surgery performed was craniotomy for excision of the lesion. Ventriculo-peritoneal shunt placement was done in one patient who developed hydrocephalus.

In the present study zygomycosis (mucormycosis) was the most common organism found (70%) to cause CNS fungal infection. Another study also observed mucormycosis as the most common CNS fungal infection causing intracranial fungal granuloma, where it was described mostly with diabetic ketoacidosis in whom high sugar levels reduce binding of iron to transferrin, leading to increased levels of free iron thus promoting the growth of this fungus. [4] In their study, diabetes was the underlying predisposing factor in 95.6% of the subjects with mucormycosis, while in our study diabetes was the underlying predisposing factor in only one of the subjects with zygomycosis (14%).

CNS zygomycosis is a worldwide fungal infection caused by class zygomycetes such as the genera Rhizopus, Rhizomucor, Absidia and Mucor. [7]

Zygomycosis is an opportunistic fungal infection and the distribution of its different clinical types is more according to predisposing factors than on gender, race, age or geography. [7]

Invasive zygomycosis is an important concern as the world's highest number of cases of this disease are reported from India. This is commonly observed in patients with uncontrolled diabetes mellitus. [8]

Sundaram et al., in 2005, studied 46 patients with cerebral zygomycosis. Tissue obtained at a biopsy showed necrotic tissue with neutrophilic infiltration with broad non-septate hyphae showing irregular branching. [9]

Phaeohyphomycosis is the second most common fungal infection obtained in our study. Phaeohyphomycosis is a term used to describe infections caused by fungi [7],[10] that contain melanin in their walls which impart the characteristic dark color to their conidia and hyphae. Melanin plays an important role in the pathogenesis of infections caused by fungi. Cladophialophora bantiana was the most common species responsible for cerebral disease in one of the study. [11]

Third type of fungus obtained in our study is Aspergillus, which constituted 10% of our subjects, while it was the most common organism identified (63%) to cause CNS fungal infections [7],[10] in previous study. [5]

A hospital-based analysis of the available information from India suggests that in the non-HIV patient population, hyphal forms like aspergillosis and zygomycosis are the most common pathogens, while yeast forms like Cryptococcus and Candida[8],[12] are the prime pathogens in cases of HIV/AIDS, the altered macrophage function acting in synergy with suppressed cell-mediated immunity. [8]

CONCLUSION

Invasive CNS fungal infection can present as intracranial space occupying lesions and may mimic glioma or meningioma clinically and radiologically. They may occur in both immunocompromised and immunocompetent patients. Massive paranasal sinusitis may be one of the predisposing factors for CNS fungal infection. Zygomycosis was the most common cause of intracranial fungal granuloma in our study. Fungal infections should always be excluded in patients with inflammatory or granulomatous pathology of CNS (whether meningeal or parenchymal).

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